Notes and Queries.

"The Best Curriculum."—It may be granted at the outset that the choice of curriculum must depend mainly on its value as an educational instrument. The advocates of a scientific course maintain that as strongly as any, and the contrary is a quite exploded fallacy. The question, therefore, really is, What is the best educational instrument? Perhaps it is necessary to make a little clearer what scientific training really means. As understood by men of science, it is not the acquisition of any number of facts physical or other. If this were all, they would admit that learning an equal number of words, say Latin, would be just as good an education. Nor is it even the explanation of physical phenomena. This may be as unscientific (even when quite correct) as the explanations of the Latin grammar which were given when I was at school, and probably are still. It is more essentially a question of method even than of subject. Physical science subjects taught as we were taught Latin would in no way carry out the idea of the scientific training advocated by men of science, though what may appear the converse of this proposition cannot be admitted, that classics well taught might answer as well.

Choice of subject therefore, although very important, is not the whole question. The difference between the two schemes is that learning science in the manner approved by men of science implies personal observation and individual reasoning on the part of the scholars, not only incidentally and occasionally, but continually and habitually, and as the most essential part of the system, whereas classical education is chiefly the interpretation of ancient, and sometimes quite dead books, and committing to memory rules of grammar more or less rational in themselves, but which cannot appear anything but arbitrary to the learners. Even the practice of using and applying these rules is only practice in a sort of ingenuity, for they are after all but rules to the pupil. Now observation and reasoning are the foundation of all real knowledge, while interpreting and using rules are merely useful arts. There is thus a very fundamental difference between the two systems—one aiming to strengthen the faculties by which a man acquires real knowledge for himself, and the other the faculty of understanding knowledge recorded by some one else. The latter, therefore, tends to exaggerate the value of mere authority, while the other favours independence of thought. One is only fit for an absolute conservatism now almost extinct, while the other is essential to enlightened progress. Classical teaching does not in practice, for the vast majority of school boys, do much to help the pupil even to understand

knowledge which has been recorded; besides that, the knowledge acquirable (from the classics) is but an infinitely small part of what is to be known, and is, as to a good deal of it, much better not known till a much later age. It is of course admitted that a part of classical literature is of great interest, and tends to elevate and broaden the mind. But to make use of this, it is not necessary to make classics the main educational instrument. All that is best in classic literature has been translated into English far better than any but very first-rate classical scholars will ever translate it for themselves, and would naturally be included in the study of literature which is admitted to be part of *any* sound course of education. And a boy who has had such a scientific training as I refer to will be the best able to comprehend these valuable parts of classic literature; and, also, as a better and more frequent thinker and observer, will be better able to appreciate all literature and art than the mere student of languages, and to distinguish the true and the meretricious without need of blindly following the critics and commentators.

A further incalculable advantage of scientific teaching is that it develops *every* faculty of the mind. Take the power of observation: In learning a language, it is true, you may learn to be sharp at observing niceties of inflexion and quantities, although they are things so deadly uninteresting to the average schoolboy that he does not make rapid improvement in his power of observation by this means. But direct his attention to physical science, and he has an absolute infinity of occasion and opportunity for observation of every sort—near and distant, minute and grand, fleeting and permanent; observations, too, by every sense, and observations which have a natural and inexhaustible interest to the youngest and to the oldest. The same infinite extent of subjects for thought, reflection, and reasoning may also be claimed, not only for the whole range of science, but for almost any one science which a man may have been so happy as to master.

Regarding the moral qualities which need education, it is admitted that truth is the basis of all sound ethics, and there is no kind of education which teaches the sacredness of truth so strongly as the investigation of physical science. It is enforced in every direction. If original research be attempted without absolute reverence for the most exact truth, it may as well be given up at once. The stern logic of inexorable law will not permit the slightest prevarication or shadow of a turning from absolute truth. It is one of the most important rules for an experimenter to learn, and a very difficult one, that his inquiries must be absolutely single-minded and solely directed to the question, "What is true?" without allowing himself even to wish that the truth may be this or that. If he does he will fall below the standard required of seekers after truth, and will probably fail. This strict impartiality and sole regard to what is true is more difficult to learn than those who have not tried can well imagine, and it is a moral training of great value. It is hardly conceivable that a man should be most rigidly truthful in one department and untruthful in others, and as a matter of observation it is not so. The most sternly truthful men of the present generation are men of science, as it is only natural to expect. The very conception of truth has been greatly raised in modern times by scientific habits of thought and the influence of men of science. Or take the faculties of wonder and admiration, awe and worship, or the sense of infinity, of law and order, delight and pleasure, in nature and beauty. That all these owe enormous debts to the scientific progress of our own generation cannot be denied, and this historical fact shows that these faculties must and cannot but be stimulated and educated by the study of nature in a way and to a degree that no other study can distantly approach.

Then, what stimulus to imagination is equal or comparable to scientific inquiry, or where is it so well rewarded? It may not be generally known, though it is well recognised among themselves, that successful discoverers owe as much to their imagination as to their reasoning. They are poets, and their inspiration is akin to that of poets. It is difficult to compare thoughts as to their magnitude, but I hardly think many people, well acquainted both with scientific research and general literature, would put many of the scientific inspirations at all below even the grandest poems. How many works of "letters" will compare (even as an effort of imagination, either in the originator or to the student) with Newton's magnificent generalisation of the law of gravitation pervading the entire universe? As an instance of the effect of scientific study in giving new ideas even to ordinary minds, it is only necessary to refer to the now popular word "Infinity," once only a metaphysical conception quite ungrasped by the many, but which has become in this generation a reality to all by the revelations of science about time, distance, and magnitude. It has also been maintained with great truth that the study of pure science is the best school of language. Living brilliant examples of literary style are almost enough to prove this; or, viewed in another way, must it not obviously be, as De Morgan used to tell his class, a far better exercise in writing English to write out, in a clear and convincing way, a proof of a mathematical theorem a boy has really understood and grasped, than to write an essay on some abstract subject or historical spectre which he really knows nothing about. Such essays are necessarily but *réchauffés* of other men's thoughts—but the demonstration *may* be really his own; besides that, the student is under the necessity of studying accuracy and clearness of language and sound reasoning, and finds sophistry useless. It does not, indeed, teach the art of making "the worse appear the better reason," but that prospect we can contemplate without regret.

And then what opportunities for training of hand and eye (and, in a less degree, other senses) occur in the innumerable inducements to practice drawing, making experiments, and use of instruments of precision. It must be admitted that there cannot be a thorough mental training without a manual training. In a man whose hand can do nothing but write, not only the hand but the brain suffers from the neglect. I will only refer to one more advantage—the overcoming of difficulties. Mr. Keeling claims this as an advantage for classical education. But how can the petty and limited and comparatively invariable difficulties of a translation compare with the infinite number and variety of difficulties met with in any natural science—difficulties too of all degrees of hardness, from little difficulties within the power of a small boy to problems insoluble by the ripest genius?

This suggests also the inevitable result that one of the characteristics of a scientific student is a profound and ever-growing humility. It was Newton, after his vast achievements, who felt himself to be only as

a little child. And I have no doubt this was not sham modesty, but a profound conviction, for what Newton felt is literally true, and is recognised to be true by all the leaders in the scientific world, for the field of knowledge still remaining to be discovered is immeasurably vast, and the man who knows most has but a wider view of the unknown. But it is possible to master all ancient lore, so it has happened that students only of this have seemed to imagine they know everything—a result of stupendous ignorance.

Although I wish to consider the value of science teaching solely from the point of view of its value as an educational instrument, it must not be forgotten that the living interest of the subject is a vast factor in its power for this purpose, and, therefore, cannot be overlooked as merely utilitarian. It is now, of course, admitted that to *interest* the student is a great part of the battle. But a boy must be dull indeed if he can take no interest in any science well taught. Most boys, if they are well taught, take a very great interest in scientific study. This alone doubles and trebles its value as an educational instrument. Another proof of this interest is that men who have mastered the elements of any science usually keep it up through their whole lives. How many Latin scholars do so even for five years? I am afraid I must apologise for the length of my remarks. But this may be enough to prove to those not too wedded to antiquity, the vast and supreme importance of preferring modern to ancient learning.—H. D. PEARSALL, Orpington, Kent.*

Will some one who receives little boys into a school, preparatory for public schools, give us the benefit of their experience? What are the *important* subjects for home preparation, given, intelligence in the pupils, and cleverness in the teachers? What should a boy of average powers be able to do at seven years old? What should he aim at by eight, and again by nine if he is still at home? When should he begin Latin? If his father, who was at a public school, teaches him the old pronunciation, will it hinder him? Is "Via Latina" (Abbot) the best book? In geography, what are the important points to aim at? Any practical details will be most useful, and may hinder us from wasting time; those who, every term, receive new boys must know what subjects home-taught boys are most weak in. Teachers in National Schools have their lines laid down most clearly step by step, but we are left to pick up wisdom as we can.

MATER.

[* We hope for further discussion of this important subject. Will our readers be good enough to look back to the July number? They will see that two important queries remain unanswered.—ED.]